SYLLABUS

Name: ***Fundamentals of telecommunication (AESAu-E>SI6M-FT24)***
Name in Polish:
Name in English: ***Fundamentals of telecommunication***

Information on course:

Course offered by department: Faculty of Automatic Control, Electronics and Computer Science
Course for department: Silesian University of Technology

Default type of course examination report:

ZAL

Language:

English

Course homepage:

https://platforma.polsl.pl/rau3/course/view.php?id=80330

Short description:

The aim of the course is to present the basic problems related to digital data transmission in telecommunications systems and the use of digital signal processing methods for this purpose. The aim of the laboratory and project is to familiarize students with the practical aspects of the implementation of telecommunications algorithms.

Description:

ECTS: 2
Total hours: 50 (30 contact hours / 20 student's own work hours)
Lecture 15h
Laboratory:15h
Student's own work: preparation for classes

Lectures:
Noise in modulation systems. Multilevel and orhogonal signals transmission over AWGN. Spread spectrum modulation. OFDM modulation. Basband transmission. dTMF signalling. MIMO techniques. Channel coding.

Laboratory: Frequency shifting. ΔΣ data converters. Frequency selective ΔΣ data converters. Baseband data transmission. MSK/GMSK modulation. QAM modulation. Spread Spectrum modulation. OFDM modulation.

Project: Python implementation of advanced modern algorithms of digital signal rocessing used in data transmission systems. Examples of project: Blind channel identification. MIMO channel coding. Data synchronization. Fast LDPC decoding. Fast decoders of Turbo codes.

Bibliography:

A. A. Giordano, A. Levesque, Modeling of Digital Communication Systems Using Simulink, Wiley 2015.
A. Grami, Introduction to Digital Communications, Elsevier, Amsterdam, 2016.
S. Haykin, Digital Communication Systems, Wiley, 2013.
B. P. Lathi, Zhi Ding, Modern Digital and Analog Communication Systems, Oxford University Press, 2009.
J. G. Proakis, Digital Communications, McGraw – Hill, 2008.
B. Sklar, P. Kumar Ray, Digital Communications. Fundamentals and Applications, Pearson 2009

Learning outcomes:

1. He knows the notion of the power spectrum of the noise – K1A_W11.
2. He knows the basics of spread spectrum modulation – K1A_W9.
3. He knows the basics of QAM modulation – K1A_W6.
4. He can design a simple simulator of data transmission – K1A_U9.

Assessment methods and assessment criteria:

Students must solve two to four computational problems for each topic, requiring MATLAB numerical experiments. The results of the experiments are assessed (E). The MATLAB code produced by the student is also evaluated, specifically in terms of structure, style, clarity, and documentation (K). Students must obtain a minimum of 50% of the points to pass. The final grade is calculated as the average of all the grades received.
The grade is rounded according to the following rules:
[60% – 65%) - 3.0
[65% – 75%) - 3.5
[75% – 85%) - 4.0
[85% – 95%) - 4.5
[95% – 100%] - 5.0
The syllabus is valid from the academic year 2025/26 and its content can be subject to changes during the semester.

Course credits in various terms:

<without a specific program>

Type of credits	Number	First term	Last term
European Credit Transfer System (ECTS)	2	2024/2025-Z	